STATE OF VERMONT
PUBLIC SERVICE BOARD

Docket No. 7032

Petitions of Vermont Electric Power Company, Inc. ("VELCO"), Green Mountain Power Corporation ("GMP"), and the Town of Stowe Electric Department ("Stowe") and for a certificate of public good, pursuant to 30 V.S.A. Section 248, authorizing VELCO to upgrade a substation in Moretown, Vermont; construct .3 miles of side by side single pole tap; construct a switching station in Duxbury, Vermont; construct 9.4 miles of 115 kV transmission line; upgrade an existing GMP 34.5 kV subtransmission line; construct a substation in Stowe, Vermont; and for Stowe to construct 1.05 miles of 34.5 kV subtransmission line in Stowe, Vermont.

VERMONT AGENCY OF NATURAL RESOURCES' PREFILED TESTIMONY OF ANNE HUNTER

Q1. Please state your name, business address and occupation.

A1. Anne Hunter, Roxbury District Fisheries Office, 3902 Roxbury Road, Roxbury, VT 05669. I am a District Fisheries Biologist with the Vermont Department of Fish and Wildlife ("Department").

Q2. Please describe your educational background and relevant work experience.

A2. I currently plan, prioritize, develop, and implement fish management programs and projects that may include habitat surveys, population monitoring, data collection and analysis. I also assess the impact of proposed developments upon species or habitats and participate in regulatory proceedings. I have an undergraduate degree in biology from Vanderbilt University in Tennessee. I earned my Master's degree from Virginia Polytechnic Institute and State

University's natural resource management program in fisheries science. A resume is attached (Exhibit ANR KG - 1).

Q3. What is the purpose of your testimony in this proceeding?

A3. The purpose of my testimony is to provide the Agency's position on the proposed Project with respect to several water-related environmental criteria that are reviewed by the Public Service Board pursuant to 30 V.S.A. § 248(b)(5). Specifically, I will discuss the Project's construction impacts, which are touched upon under several criteria, including headwaters (1(A)), streams (1(E)), shorelands (1(F)), and soil erosion (4).

Q4. Are you familiar with the proposed Project?

A4. I am generally familiar with the Project and have reviewed VELCO's prefiled testimony regarding the issues I listed above. VELCO has determined that the project will cross a total of 32 streams of which 8 are seasonal, 17 are permanent, and 2 are rivers (the remaining 5 were considered to be ditches). Most of the streams associated with the project are headwater streams and occur within the Winooski River drainage.

Q5. What are the most sensitive areas of this Project?

A5. The most sensitive areas associated with this project related to aquatic resources are stream crossings and riparian buffers (or areas associated with streambank or lakeshore vegetation). As discussed elsewhere, the information that VELCO has provided is general in nature. It will be important for Agency staff to review the route in the spring after snowmelt and final design have occurred in order to assess the streams and riparian buffers that may be affected.

Q6. **Can you explain the importance of streambanks and lakeshores and avoiding impacts to them?**

A6. Yes. Naturally vegetated riparian buffers (that vegetation located along streambanks or lakeshores) provide a variety of ecological functions and values. Riparian buffers offer shading that moderates extreme water temperatures in summer and winter, affecting how much oxygen the water can hold (higher water temperatures hold less oxygen). Also, lower light levels inhibit algal growth, which maximizes dissolved oxygen in the water. Buffers slow overland runoff, allowing the buffer to filter out sediment originating from upland areas. Buffers also minimize lakeshore erosion, instream scour, bank erosion, and sedimentation associated with channel instability, reducing sediment loads to receiving waterbodies (Ripariain Buffer Guidance, January 2005, http://www.anr.state.vt.us/site/html/buff/anrbuffer2005.htm).

The functions of shading and erosion control are essential in protecting aquatic biota and the habitat on which they depend. For example, fish are dependent on specific temperatures such that if water temperature is too warm or too cool, fish may not survive or may exhibit depressed growth. A difference of only a few degrees can impact species composition of the stream. Sedimentation causes habitat reduction and habitat change, resulting in a number of physical and biological effects, such as lower reproductive success of fish.

Q7. What are the general guidelines that the Department recommends for stream crossings?

A7. First and foremost, the Department recommends that stream crossings for construction or maintenance be avoided to the greatest extent possible. If stream crossings are necessary for construction or maintenance, then site-specific erosion prevention standards should be strictly adhered to at stream crossings to minimize downstream sedimentation during construction. To maximize erosion prevention and sediment control, an attempt should be made to design perpendicular, or near perpendicular, crossings to lessen impact to riparian vegetation. Riparian vegetation should be protected during construction, leaving streambank vegetation intact as much as possible to help prevent streambank erosion and provide shading. All instream work should be performed during the period from June 1 to October 1. The Department routinely recommends this time period as a construction window for instream work, because it protects certain fish species such as brook trout during their spawning season. The work area should be isolated from stream flow or "in-the-dry" as much as possible. The Department routinely recommends that construction take place under conditions which prevent downstream sedimentation.

Q8. **When a stream crossing is necessary, what type of stream crossing does the Department recommend?**

A8. If a stream crossing is necessary, the Department recommends that a bridge be constructed. Bridges are preferable because they avoid instream work. However, they must be appropriately designed. A bridge that is appropriately-sized should not alter instream habitat (i.e. flow constriction, stream aggradation or degradation). The Department recommends that the bridge abutments be placed

wide enough to pass "bankfull flow," the flow that commonly moves the most sediment and large woody debris, and poses the greatest flow concern for the longevity of the structure. Information on how to determine bankfull width is available in the Vermont Agency of Natural Resources Stream Geomorphic Assessment protocols, Appendix K, available at http://www.vtwaterquality.org/rivers/docs/assessmenthandbooks/rv_weblinkpgappendixs.pdf.

Culverts are less preferable stream crossing alternatives, because instream habitat is altered and because of increased sediment discharge during installation. If culverts are not appropriately installed, the likelihood that these structures will act as a barrier to fish movement, affect fluvial dynamics of the stream, and require chronic maintenance is high. If culvert installation is deemed necessary, then the Department would like to consult with the applicant to determine appropriate culvert design. The biological consequences of improper culvert installation to aquatic communities may include: direct loss of aquatic habitat; loss of resident aquatic populations (by preventing recolonization of upstream habitat after catastrophic events, such as floods or toxic discharges); loss of access to critical spawning, rearing, feeding or refuge habitat for aquatic organisms; and altered aquatic community structure altered genetic composition of aquatic populations. These biological impacts result from restricting the movement of aquatic organisms within the stream network.

In addition to the biological consequences of impassable stream crossing structures, there are significant stream stability issues related to these structures. If the structure is unable to transport the sediment and debris delivered to the structure, then upstream aggradation may result (which may exacerbate streambank erosion) as well as downstream degradation (which leads to bank instability and channel widening). Degradation is the removal of streambed materials caused by the erosional force of water flow that results in a lowering of the bed elevation (the opposite of aggradation). To achieve proper culvert installation, the Department offers the following general guidelines: the structure width should equal or exceed bankfull width and the structure should match overall stream gradient at the site as closely as possible.

More detailed technical assistance on culvert design to address fish passage and sediment transport are available and the Department would provide those sources to the petitioner. The Department is also willing to provide technical assistance on the design of specific stream crossing structures.

Q9. What are the Agency's recommendations to protect riparian buffers associated with this project?

A9. First and foremost, the installation of project structures should avoid riparian areas. If vegetation removal or control should occur in riparian areas (i.e. for a stream crossing or shoreline crossing), then vegetation removal or control should be performed manually with no use of herbicide. Within riparian areas,

vegetation removal and control should be as limited as possible. Vegetation "topping" instead of clearing is recommended in these areas to provide some shading and erosion control functions.

Q10. **On page 8 of his prefiled testimony, Mr. Gilman discusses a "typical buffer" for streams. Can you discuss appropriate buffer size and their rationale for streambanks and lakeshores?**

A10. In all cases, the final buffer width recommended by the Agency will be based on what is required to maintain or enhance the functions and values of the riparian area at the project site. The Agency normally recommends a minimum riparian buffer zone width of 100 feet for lakeshores. A buffer width of 100 feet will in most cases provide adequate treatment of runoff from upland areas and minimize lakeshore erosion. The minimum buffer zone width normally recommended for streams is 50 feet or 100 feet, depending on the specific characteristics of the site (Ripariain Buffer Guidance, January 2005). To "maintain waters in their natural condition," protected buffers should be "undisturbed" such that no construction, no mowing, no cutting, or no activity occurs in the buffer that alters the natural vegetation. Buffers are measured horizontally from the mean water level, top of bank (when the channel has a flat, wide floodplain), or top of slope (when a channel is contained in a narrow v-shaped channel with steep slopes), depending on site characteristics, to the edge of allowed project activity. The specific characteristics of a particular riparian corridor are important in determining the width of the buffer zone and may include channel stability, slope of the land, and aquatic habitats or communities present (i.e. large rivers require larger buffers to

maintain natural channel functions). Hence, the Agency would request a minimum riparian buffer of 100 ft at Waterbury Reservoir, Little River, and Winooski River. The Agency would normally request that all other streams associated with the project have a minimum buffer of 50 ft. The applicant should delineate top of bank or top of slope and the proposed buffers on project site plans and describe how the project will protect riparian buffer functions within the framework of Agency recommendations.

Q11. Does this conclude your testimony?

A11. Yes it does.